STATEMENT BY MINISTER

Re. Launch of augmented satellite Launch Vehicle—ASLV-D2 and INSAT-1C.

THE MINISTER OF STATE IN THE MINISTRY OF SCIENCE AND TECHNOLOGY AND THE MINISTER OF STATE IN THE DEPARTMENTS OF OCEAN DEVELOPMENT, ATOMIC ENERGY, ELECTRONICS AND SPACE (SHRI K. R. NARAYANAN): Sir, the second developmen al flight of ASLV with SROSS-2 satellite on-board was launched from Sriharikota at 14.48 hours IST on the 13th July, 1988. The performance of both the strap on motors, which were ignited simultaneously, and of the vehicle upto the first 48 seconds was normal. The first stage motor which did not ignite in D-1 flight did get ignited this time as programmed at 48.5 seconds. However, at above 49.5 seconds after lift off, the yaw and roll rate of the vehicle started building up rapidly and could not be controlled by the Rocket Control System resulting in the severance of the top end of the vehicle at 50.4 seconds. Consequently the command for the separation of strap-on motors was not received. The first stage motor with the burnt out strap-on motors, however, performed normally till its burn out at about 97.8 seconds. The prematurely detached SROSS-2 Satellite also performed normally till its splash down at 25.7 seconds after lift off.

In spite of incorporating all the recommendations of the ASLV-D1 Failure Analysis Committee end all the care taken another failure has occured. It may be remembered, however, that all flight conditions cannot be fully simulated on the ground.

Immediate action has been taken to constitute a Failure Analysis Committee of ISRO to look into the voluminous data now available. A National Expert Review Panel has also been set up to go into all aspects of the flight.

We have more cheerful news from Hassan in Karnataka. The INSAT-1C space craft was launched by the Ariane-3 Launch Vehicle from Kourou in French Guyana into a geostationary transfer orbit of 36000 x 200 Km at 0442 hours IST on the 22nd July, 1988. Within 10 minutes after the separation of the satellite from the Ariane, INSAT Master Control Facility at Hassan took full control of the Satellite. Two of the five solar panels and the C-Band Antenna were deployed at around 0615 hours on 22nd as planned. Two major firings of the apogee motor for 23 minutes each were carried out, one on 23rd and the second on 24th July to raise the perigee from 200 Km. to about 3300 Km. With the successful firing of the apogee motor for 90.5 seconds on 25th morning, the INSAT-1C has now reached near geosynchronous circular orbit, and will reach its final destination of 93.5 degrees East longitude in a few days. The critical manoeuvres of full solar array deployment and placing INSAT-1C in a body stablised mode were also successfully accomplished on 26th July, 1988. Deployment of C/S band antenna and solar sail release have been accomplished as scheduled on 27th afternoon, INSAT-1C Spacecraft has since been placed in the 3-axis stablised mode in its full configuration. Hereafter, exhaustive on-orbit tests will be carried out to characterise each of the payloads before the spacecraft is declared operational. The INSAT-1C will provide back-up to INSAT-1B now in operation and will also substantially augment the existing telecommunication and TV programme distribution capacities.

As Hon'ble members are aware, the ultimate aim of our Space Research Programme is to achieve self-reliance in the peaceful use of outer space. On behalf o the House, I wish to congratulate the scientists of ISRO for the success of the INSAT-1C Mission and to tell them tha they should not lose heart because of the ASLV-D2 failure We have full faith i them and shall stand by them in thei efforts to achieve our goal in space research.

DR. YELAMANCHILI SIVAJI (Andhra Pradesh): Madam Deputy Chairman similar failure took place on 10th August 1979, on 31st May 1981 and on 24t March, 1987. In view of all these failures what preventive measures are taken? I spite of all the precautions, how did

[Dr. Yelamanchili Sivaji]

fail once again? What investigation is done in regard to the earlier failures? We are going to launch ASLV-CI in 1989 and ASLV-C2 in 1990. What safety measures are taken to prevent such things? It is reported that a French Co.—Societe Europenne de Propulsion Co.—denied to supply technology to ISRO. What steps are taken to overcome this? Is the Government contemplating to change the site under the guise of gravitation problems and the like? For God's sake, I appeal to the Government not to shift the site. Are you prepared to exploit the expertise of the N.R.Is. who are working in the space research programmes in several other countries. On 27th September, Prof. U. N. Rao, told that ISRO can't meet the demand unless indigenous electronic industry gears up. In view of this, what steps are taken to achieve the desired interaction between ISRO, B.E.L. as well as the industry? Will the on-going programmes be affected due to this failure? Is there any proposal to reorganise the National Space Agency?

An European Communication Satellite (ECS—5) will be the co-passenger for INSAT-IC INSAT—IC, built by the Ford Arospace and Communications Corporation of U.S.A. has suffered a delay of two years following explosion in the U.S.A. space shuttle—Challenger—in January 1986. What steps are taken to recoup this loss of time? Is there any reasonable share of benefits earmarked for the rural areas out of this INSAT-IC?

SHRI VITHALRAO MADHAVRAO ADHAV (Maharashtra): Madam Deputy Chairman, first of all I would like to take the privilege of congratulating our scientists who have made a tremendous progress in the field of space research. Secondly, under the leadership of our Prime Minister, Shri Rajiv Gandhi, a new scientific and technological atmosphere is created in this country. Though there is a failure of ASLV-D2 and the space launch vehicle, I would say that it is the experimental stage. Even in the advanced countries like the United States of America, 50 per cent of the space launch vehicles have failed. This space launch vehicle was totally or completely indgenous. Madam, the ASLV is the second generation launch vehicle of the ISRO developed at Vikram Sarabhai Space Centre, Trivandrum, capable of putting 150 kilogrammes in orbit. It is this class of satellite. As ISRO's Stretched Rohini Satellite Series (STROSS) was put into low earth orbit, ASLV-D2 was also launched from Sriharikota.

The first fight in March last took an erratic turn and plunged into the sea following ignition failure of the rocket stake. The failure of the first ASLV-D1, according to Dr. U. R. Rao, a space scientist, occured because an electro-mechanical safearm meant as a barrier between the first stage motor and the pyrotechnique charge has been dispensed with. The safearm was suspected to have jammed during the ASLV's abortive first flight. This ASLV-2 failure is the second rocket failure, within 15 months. The expenditure on this was Rs. 20 crores. The successive failures have raised doubts in the minds of the people about the new technology introduced into the first generation ASLV-3 rockets for augmenting its payload from 50 to 150 kg. Then ASLV is basically an improved version of SLV-3 with two strap-on-boosters for increasing the payload capacity. Despite one year of investigation, scientists failed to pin down the exact fault. According to ISRO, the modification introduced in ASLV-2 were based on suspicious doubts that acoustic vibrations from the solid booster must have been responsible for the failure of ASLV-1 but it was ruled out by the Investigation Committee. According to the launch schedule of ASLV-2, it was supposed to inject the satellite into oribit within 458 seconds after the let off. But the mission failed to pick up the signals from the rocket within 210 seconds after the launch.

Madam, India has made a landmark in research of space field from 19th March, 1975 to 19th March, 1988 by launching 10 satellites right from Aryabhatta, Bhaskara-1 two Rohinis, one SROSS and one IRS-1-A. These are the satellites which have been launched from different space stations abroad. But as far as the Indian space station is concerned, we have become failures twice. We are doubtful about the

satellite which has to be launched from Sriharikota. America has got 50 per cent failures in their launching of vehicles and satellites. But we are continuously getting the failures. So, we must investigate as to where we failed actually. We must investigate whether our suspicion about this fault of the first ASLV was correct or not and whether the improvements done on the ASLV-2 were based on the investigations of the failure of ASLV-1. I think, the investigation into the failure of the first Space Launch Vehicle was not correct. And it should be properly investigated as to what is the lacuna.

Secondly, Madam, I would like to congratulate our scientists for launching INSAT-1C from the French Guyana space launching station into the orbit and it is going to take place after INSAT-1B in respect of augmenting our telecommunications and our Doordarshan programmes. And really India has done a lot of progress. But we must know as to what is the reason for this ASLV-D2 failure. We must be very careful next time and we must be more conscious as to what is the reason for the failure earlier. Though the scientific community is deeply in grief now due to this failure, they should not lose their heart because this is an experiment. Madam, our scientists are outstanding. Even in NASA more than 5,000 Indian scientists are working in their space research programme. And our Indian scientists are of a very high quality. But we must find out as to what is the reason for that failure. Is it a scientific reason or an administrative reason or is there any treachery in this failure? So, I would request the hon. Minister to clarify to this House as to what is the exact reason for this failure. Thank you, Madam.

DR. (SHRIMATI) NAJMA HEPTULLA (Maharashtra): Thank you, Madam, for giving me this opportunity. And after a very elaborate description of the scientific terminology which my colleague, Mr. Jadhav used, I don't think it is necessary for me to go back into all the details. Madam, while speaking on this, I will first congratulate our scientists who have taken a lot of pains and successfully launched our INSAT-1C satellite into the geostationary orbit. And I am sure that within one or two days, as the Minister has explained, it will be fully augmented and in full use. Madam, I had an opportunity to see this INSAT-IC in 1985 in the United States when it was at the test belt research and they were going to launch it from the US. But unfortunately due to the failure of the space programme Challenger in the United States we had to shift it to the French launching station Kuru in French Guyana. So we should not be disheartened because failures have taken place even in the most advanced countries, whether it is the USA, the USSR, France or any other country. But as we congratulate our scientists, we are also worried because a country like ours has got constraint on resources and we are trying to be on our feet and be self-sufficient and self-reliant in our space programme, and when our hard saved finances are diverted to our research, we should see that there are less failure in our mission. Advanced countries, which have got enough resources, can afford these kinds of failures but we cannot and I feel that our Government and our scientists will leave no stone unturned to find out the reasons of the failures of the two missions, D-1 and D-2. I think it is some mechanical defect in designing or even in some programming which caused these failures and we should try our level best to find out the reason so that the next launch which we do should not end up in such a failure. It hurts us economically very much. Otherwise our scientists have taken a lot of pains and I should congratulate them and they should not be disheartened. I was sent a note from one of our officers from the Table that I may like to say it in Urdu.

"गिरते है शह सवार ही, मैदाने जंग में
वो तिफ्ल क्या गिरेगा, जो घुटनों के बल चले।"

हमने जब आसमान की बुलंदियों में अपने सेटलाइट भेजे हैं, तो कभी-कभी तो वे गिरेंगे भी। लेकिन जो चले ही नहीं या घुटनों के बल चलते हैं, उनके गिरने का सवाल ही नहीं होता।

So, we should not be disheartened and

[Dr. (Shrimati) Najma Heptulla]

we congratulate our scientists for their good efforts.

SHRI M. KADHARSHA (Tamil Nadu): Madam Deputy Chairman, I would like to congratulate our scientist for successfully launching the INSAT-IC. But, at the same time, I am worried that the launching of the ASLV has failed for the second time. I would like to know why although the Indian Scientific Research Organisation is working on this project for the last eight years, and in spite of that, the ISRO could not launch it successfully. Madam, I would like to know from the hon. Minister whether there is anything wrong with the existing system of the ISRO, whether the Government will totally review the functioning of the ISRO because there are reports that there are bickerings and in-fighting going on between the staff of the ISRO. I would like to know from the hon. Minister whether the ISRO will be completely reorganised.

Madam, when ASLV failed for the first time when it was launched from Sriharikota in March 1987, the Government set up a fault finding analysis committee to go into the exact causes and this committee went into action with much fanfare, with 77 sub-committees, and the report was submitted in August last. I would like to know what are the findings of the committee. Will the report be made public? If our scientists had gone through the report of the failure analysis committee, I am sure this second failure would not have happened.

Madam, I would like to know what are the spheres in which India is deficient in scientific technology. Many of the Indian scientists are living abroad because they are unable to get remunerative jobs here. When our Prime Minister was abroad, he invited many of the Indian scientists to come back to India. What is the proposal? Is there any programme with the Government to call our Indian scientists from abroad so that scientific technology may strengthen here? The ASLV plunged into the Bay of Bengal within two minutes. The Government has ordered an enquiry and set up another committee. But will there be any use of this enquiry if the object, the ASLV is allowed to remain in the sea? Will it be possible for the Government to find out the reason for its failure unless the ASLV is salvaged from the Bay of Bengal? I would also like to know whether the Government will stop these scientific activities or will it go ahead with these programmes. There is some proposal to launch Polar Satellite Launching Vehicle and Geo-Satellite Launching Vehicle and if we have failed in our ASLV missions, how will we succeed in other missions? Above all, it is reported that more than Rs. 20,000 million are required to launch these programmes. I would like to know whether the Government will be able to afford this large amount of money when many of our welfare schemes are pending for want of financial resources.

SHRI VISHWA BANDHU GUPTA (Delhi): Madam Deputy Chairman, whenever we go into the unknown, we have failures as well as successes. In the case of ASLV D-1 and D-2, we have had problems. But when we are dealing with high-tech programmes and try to stand on our own legs, I think it is important to pay the price that it deserves and it needs to reach a stage where we can be at the highest level with the rest of the world. In spite of these failures, I would like to congratulate our scientists who have successfully launched INSAT-IC, and not only for that but also for the great efforts made in the other two ASLVs where we failed.

The hon. Minister stated that INSAT-1C would provide a back-up for INSAT-1B. What is the life that he feels is still left with INSAT-1B? How long it will continue to serve us, and also what is the projected life of INSAT-IC? Secondly, I would like to know as to what other uses it can be put to, other than TV, and whether the facility of this new satellite is going to be available to private users like the newspapers, the radio stations and others who have a better telecommunication system and have a larger number of simultaneous publication of the newspapers? I would also like to know whether in the enquiry, the Minister is thinking of associating other scientists not only those who are working here and those working outside and who are of Indian origin, but perhaps others as well who have also been associated in similar enquiries to find out

reasons for such failures in their own countries. I am talking of Russians, of Americans who have also had failures in their countries. In fact, since they have launched manned satellites, they have lost many trained astronauts and cosmonauts in trying to reach higher standards in space research.

Madam, the final thing I would like to know is, what is the projected plan which the hon. Minister has till, let us say, the 21st Century; whether at that stage, at that point of time, we would be fully abreast and equal to the rest of the world in trying to explore planets and other things not only for the benefits of our country but for the entire mankind.

PROF. (MRS.) ASIMA CHATTERJEE (Nominated): Madam Deputy Chairman, first of all, I would like to thank you for giving me an opportunity. I would like to associate myself with the sentiments expressed by the hon. Minister on the success of the INSAT-IC mission and I would like to congratulate the scientists of ISRO on their success.

I do hope that INSAT-1C will reach its geo-synchronous circular orbit and will provide back-up to INSAT-IB which is already in operation and will also substantially augment, as has been mentioned, the existing telecommunication and TV programmes distribution capacities.

It has been stated that a Failure Analysis Committee of ISRO has already been constituted to find out the causes of the failure. I do hope that when the analysis is completed, the report will be made available to us. I am not worried about the ASLV-D-1 failure. Scientists always believe that failures are the pillars of success. Such failures have occurred in the Soviet Union and the U.S.A. Therefore, this is not something new. I hope, this will give our scientists an opportunity to develop more, to find out better ways and means to develop scientific technology in regard to construction of space rockets so that, in the near future, they can improve their operational systems. I do hope that the failure of ASLV-D2 will not dampen the spirit of our scientists. I would like to convey through you, Madam, my congratulations to the scientists of ISRO. Thank you.

SHRI K. R. NARAYANAN: Madam, I am thankful for the optimistic note struck by the hon. Members in spite of the failure of ASLV-D2. Naturally, questions were centered more around failure because, after all, in the case of success, there is not much to improve upon but in the case of failure, we have to rectify first and then improve upon.

Dealing with the failure aspect first, Madam, when the first failure took place, in the case of ASLV-D1, I had informed the House about the report of the Failure Analysis Committee and the reasons they have given for the failure. The Committee could not give a definite, decisive, single reason for the failure. It narrowed down the range of failure to three factors. One was, inadvertent short circuit in the ignition circuits. Second, inadvertent electrical open circuit in both the ignition circuits and third randem malfunctioning of safe arm device. Before coming to this conclusion, the Committee had not only examined the voluminous, massive, data available in regard to the ignition failure, but the whole gamut of technology of the ASLV and they have concluded that they could not find on the basis of the data available, any other possible cause for this failure except these three factors that I have mentioned. The report was actually prepared after a very elaborate examination by our distinguished scientists involved in the space experiments, space research, and after it was presented to some of our most distinguished space scientists like Dr. Satish Dhawan, Dr. Abdul Kalam etc. who are outside the ISRO setup at present. As a result of the recommendations made, the modifications incorporated in ASLV D2 were, if I may read out a few of the points: First stage ignition chain, (i) added redundancy in pyro initiators, (ii) the mechanical safe arm device deleted, (iii) electrical safe arm mechanism similar to SLV-3 adopted. This is similar to SLV-3 which was a success earlier. Then (iv) the telecommand override made independent of the pyro circuit, and (v) ignition system fully qualified under vibration and vacuum environments. Some improvements were also

[Shri K. R. Narayanan]

made in the Heat Shield and in the Control Systems.

Therefore, it is after a great deal of thought, examination, deliberation and cooperative work that the second ASLV was launched. It is not possible to speculate on the causes of this failure. I would not like to do so, though newspapers have done it very liberally. Madam, as the House knows, it is one of the most sophisticated, complex technological systems and the fault could have occurred anywhere. Therefore, only until the two Committees appointed—first is the Failure Analysis Committee which is an internal Committee and the other is an external Committee, called a Review Panel under the chairmanship of Dr. Narasimha, the Director of NAL in Bangalore, one of our very distinguished aeronautical engineers and scientists—give their reports that I can say something. But I can assure the House that when the two Committees reports come—I do not know, even the last report of the ASLV Analysis Committee was so voluminous because of the data available that the whole thing could not be presented to the House but I had conveyed to the House a gist of the conclusions of this report—we would bring to the notice of the House relevant findings of these two Committees.

I have mentioned the modifications which we had introduced as a result of the findings of the first Failure Analysis Committee. Now a question has been asked about the site of the launch, about the gravitational pull and whether we are going to move the site to somewhere else. I am glad to hon. Memebr who raised this point has appealed that the site should not be changed. I think it is necessary to explain this because there have been a lot of statements and a great deal of writings on this gravitational factor in the newspapers. Our scientists have gone into this very very thoroughly and they have come to the conclusion that the gravitational factor has played no role at all in its failure. In fact, they have taken all these factors, including the gravitational pull at Sriharikota, before the site itself was selected. I would like to quote something one of the accepted text-books on space science about the role played by gravitation in space launches. I am reading with your permission, Madam:

> "Several authoritative scientific articles and text-books, for example Rocket Propulsion and Spacecraft Dynamics by Setober and Walker, have dealt with the subject of gravitational anomalies; extensively and have concluded that the effect of gravitational anomalies on rocket trajectories being several order of magnitudes smaller may be totally neglected".

This is the opinion of one of the most accepted authorities on space launching in the world.

One Indian scientist, Dr. Srivastava, had published a letter in some of the newspapers, a letter which he is said to have sent to the Chairman of ISRO but which he has not received so far. He has said that in this letter he has appended 103 or 105 articles on the subject saying how gravitation is an important factor in this and therefore should be taken into account fully. From what I have read here, the gravitational pull is so infinitesimal wherever the launching is held that it would not hinder the success of a space launch because of the tremendous thrust of the space vehicle itself.

There is more about it here, especially about Sriharikota. In fact, Sriharikota has been adjudged as one of the best sites in the world for space launches. It has been established that it is the second best after Kourou in French Guyana and the gravitational pull at Sriharikota is less than the gravitational pull at the launching site in the United States and the Chinese launch sites. At the U.S. and Chinese launch sites the gravitational anomaly is about minus 0.1 centimetre per second square. At the Japanese launch site, the gravitational anomaly of plus 0.06 centimetre per second square is available. At Sriharikota, it is minus 0.06 centimetre per second square which is less than the gravi-

tational anomaly at the American, Chinese and Japanese launching sites. I hope this will set at rest the controversy about the selection of the site having come in the way of the success of the launch.

Apart from that, I should like to say in very commonsense terms that, after all, the proof of the pudding is in the eating, though this particular pudding was burnt a little. But earlier we have launched SLV three times successfully from Sriharikota. There was one failure. Out of four SLV flights, the first one failed and three others succeeded from Sriharikota. Our defence missile, Prithvi, was successfully launched from Sriharikota and we have sent 195 sounding rockets from Sriharikota successfully. Therefore, with regard to the site at least, I think we should believe our knowledgeable space scientists when they say that the site of the launch has nothing to do with this failure and it is a very ideal site, in fact, for space launchers.

Now a question has been asked about NRI help, outside help, for these launches. Of course, I can say that of all the Indian scientists, scientists of Indian origin produced by this country, the best are in India itself, as far as space science is concerned. There has been no migration or brain-drain from this sphere of space science from India to other parts of the world. Therefore, I think we have enough capability, enough knowledge, enough expertise for launching these vehicles ourselves- and also studying and rectifying these ourselves.

As far as help from other countries is concerned. I should like to mention, Madam, that this is a very sensitive area of technology. In fact, we cannot get this technology from other countries. If any country is giving us any help in the development of this technology, even to a small extent it is because they have realised that India itself has developed sufficient expertise, that we are capable of going ahead ourselves and, therefore, they are prepared to give us some marginal help in these things. This is not a field where technology would be transferred by any other country to India or, for that matter, to any developing country. Therefore, whether it is for finding out the reasons for the failure or correcting it in the future I think we will have to rely on our own selves, and I think our scientists are quite confident of making a success of it after studying this.

It is quite legitimate that we should feel disheartened. I can tell you that people in the science field, specially those who are involved in and have dedicated to this effort, this flight, are the people who have been more dejected than even the general public over the failure of this launch, but they are quite confident of succedding.

It has been mentioned that there have been failures in other countries also. In fact, a launch vehicle equivalent to that of our ASLV is the SCOUT launch programme of the United States. I think, out of the first ten launches, nearly five or six had failed. But they were not disheartened. They went ahead and they made a great success of it. We have failed twice. I don't think it is any reason for getting too dejected or disheartened or for stopping the programme because, if you stop this programme, I can assure the House that nobody in the world will help us in our space programme at all. Even with regard to renting out or leasing out, people would be much more reluctant if we do not have a space programme of our own.

Dr. Mrs. Heptulla, you are getting restive. So, may I say something about what you said? I want to thank you for the very enlightened and knowledgeable support you have given to this. So also I want to thank Prof. Asima Chatterjee for the very powerful and knowledgeable support she has given to the scientists.

Shri Vishwa Bandhu Gupta has asked about the backup and the life of Insat 1-C. The life of Insat 1-C is around nine to 10 years and, I think, the present satellite is likely to end its life in 1989 plus or minus six months. By that time we will have the services of this INSAT 1-C. It is called "back-up" because it was intended as a back-up, but I think, it will have to do much of the job of the original satellite. I think, it

[Shri K. R. Narayanan]

important to look at the benefits. It will add another 4,000 two-way circuits for telephones, long distance telephones. INSAT 1-B gave us 4,000 circuits. There will be another 4,000 circuits provided by it, which would mean a tremendous lot for extension of long distance telephone communications to remote areas and between different parts of four vast land. Also, it is already being used for services by private agencies. I think, the newspaper, "THE HINDU", the Delhi edition we get here, is as a result of the service provided by INSAT 1-B. Now there would be more facilities available for captive type of network for private business people or industrial groups or our newspapers.

Then, of course, there are other things about television and all that. I am not going into these things.

DR. (SHRIMATI) NAJMA HEPTULLA: Will we be able to get international television programmes through that?

SHRI K. R. NARAYANAN: I don't think so, we have to depend for that on INTELSAT. This is for internal. We can go on multiplying our facilities.

About the ASLV, the second generation technology, it has been asked whether the technology is defective. Parts of the technology have been validated by both these flights. In every failure we have learnt something, and some of the new technologies we had introduced have been partially tested for a time. For example, the strap-on motors have been tested. That is new technology we have introduced. That is a successful thing. That is quite great achievement, a new breakthrough that. But I cannot say anything unless a committee appointed for this purpose go into it to find out if there are any other kinds of defects or flaws in the technology. It could be something very minor, it could be something not so minor. But, whatever it is, we are, I think, quite capable of getting at the root of it and rectifying it.

Now the treachery question has been asked. We have not found evidence of any attempt at treachery.

SHRI VITHALRAO MADHAVRAO JADHAV: How many days will the committee take to complete the enquiry? Is there any time-limit for completion of the enquiry?

SHRI K. R. NARAYANAN: We have given time limit. The last enquiry was completed in three or four months' time. I think, we will have to give them this much time. I think, they are extremely serious, earnest people. They will complete it at the earliest possible.

About reorganisation of the ISRO, from what I said, I think it is quite clear that we do not consider this failure as a failure of our scientists. In fact, it is a wrong policy even to talk about shooting the pianist, as they say. It is the scientists who can produce the results for us. There is nobody else who can do this for us, and we have complete faith, as I said in my statement, in the capability, in the expertise of our scientists. Of course, we are not contemplating any sort of reorganisation unless some specific reasons for it come up. These people have put us on the space map of the world during the last ten, fifteen years, achieved remarkable things for India in space science and recognition as one of the few developed countries which have reached this height of technologically in space science, I

don't think we have to think of reorganising our setup because of this failure. The Government is not contemplating any such thing. In fact, we would give further encouragement and support to our scientists so that they can work with even greater enthusiasm than at present in achieveing the goals given to them by the Government.

As regards future programmes, as you are aware, we have PSLV programme. I have referred to it earlier also. It has been asked, and it has been repeatedly asked by the Press, whether it would be delayed or we will be able to carry it out because of the failure of the two ASLVs. PSLV is a completely different launch vehicle from the ASLV. In fact, the work on it has been going on. I think more than 60 per cent of the work of constructing this launch vehicle has already taken place and we have planned to launch it by 1989-90. That is the time factor we have in mind. Then we are, of course, working simultaneously for the GSLV launch vehicle also. That is also based on a more or less different system. It is quite possible to wrok on all these, while continuing work on ASLV. Even the failure will be extremely useful for the successful completion of both PSLV and GSLV. I don't think there will be any notable delay in the execution of these programmes.

I would like to say about the future INSAT programmes also. Of course, INSAT-D will be launched in 1988-89 by Delta in the United States. Then we will have the second series of INSAT. Two of them would be again launched by the Ariane. After that we would be in position, and we are working for it, to manufacture the satellite as well as the launch vehicle and to launch it in India itself. The effort is to get a national launch facility, making our launch vehicles and satellite ourselves. I think by the beginning of the next century we would have reached the goal and in the judgement of our scientists we would by then be very considerable space technology power.

DR. YELAMANCHILI SIVAJI: Is there any reasonable share earmarked of the benefits and advantages of the INSAT earmarked for the rural areas?

SHRI K. R. NARAYANAN: The advantages of it in the field of television and radio will mainly accrue to the rural areas.

DR. YELAMANCHILI SIVAJI: It is true. But is there any share of benefits exclusively earmarked for the rural areas?

SHRI K. R. NARAYANAN: Most of the TV stations then actually would be established in the rural areas. We have covered more than 80 per cent of the rural areas already. With the INSAT-1C, I think we will be able to cover the entire country.

DR. YELAMANCHILI SIVAJI: What about the benefits in the field of telecommunications reaching the rural areas?

SHRI K. R. NARAYANAN: Yes, as I said, this will certainly take our telephone system to the remote areas where we would not have been able to reach otherwise. This facility, including the remote sensing, to my mind, is of greater importance to the rural areas than to the urban areas.